CLAIMS

1. A high strength electrical steel sheet and a processed part of the same characterized by containing, by mass%, C: 0.06% or less, Si: 0.2 to 6.5%, Mn: 0.05 to 3.0%, P: 0.30% or less, S or Se: 0.040% or less, Al: 2.50% or less, Cu: 0.6 to 8.0%, N: 0.0400% or less, and a balance of Fe and unavoidable impurities and containing in the steel a metal phase comprised of Cu of a diameter of 0.1 μm or less.

2. A high strength electrical steel sheet and a processed part of the same as set forth in claim 1, characterized by further containing, by mass%, one or more of Nb: 8% or less, Ti: 1.0% or less, B: 0.010% or less, Ni: 5% or less, and Cr: 15.0% or less.

3. A high strength electrical steel sheet and a processed part of the same as set forth in claim 1 or 2, characterized by further containing, by mass%, one or more of Bi, Mo, W, Sn, Sb, Mg, Ca, Ce, La, and Co in a total of 0.5% or less.

4. A high strength electrical steel sheet and a processed part of the same as set forth in any one of claims 1 to 3, wherein the number density of the metal phase comprised of Cu present in said steel is $20/\mu m^3$ or more.

5. A high strength electrical steel sheet and a processed part of the same as set forth in any one of claims 1 to 4, wherein said steel sheet has an average crystal grain size of 30 to 300 μm.

6. A high strength electrical steel sheet and a processed part of the same as set forth in any one of claims 1 to 5, wherein the steel sheet has a processed structure remaining in it.

7. A high strength electrical steel sheet and a processed part of the same as set forth in any one of claims 1 to 6, characterizedin that the steel sheet or the part contains a Nb carbide or nitride.

8. A method of production of a high-strength electrical steel sheet and a processed part of the same as set forth in any one of claims 1 to 7, wherein the sheet or the part is held at a temperature range of 300°C to 720°C for 5 seconds or more for heat treatment in the production process.

9. A method of production of a high strength electrical steel sheet and a processed part of the same as set forth in claim 8, characterized by, as said heat treatment, holding at a temperature range of 300°C to 720°C for 5 seconds or more in a cooling process from a temperature range of 750°C or more in a final heat treatment process.

10. A method of production of a high strength electrical steel sheet and a processed part of the same as set forth in claim 8 or 9, characterized by, after the heat treatment, holding in a temperature range over 800°C for 20 seconds or more.

11. A processed part of a high strength electrical steel sheet as set forth in any one of claims 1 to 7, characterized wherein the part is heat treated after processing for shaping so that the metal phase comprised mainly of Cu present in the processed part has a number density of $20/\mu m^3$ or more.

12. A processed part of a high strength electrical steel sheet as set forth in any one of claims 1 to 7 and 11, characterized wherein the part is heat treated after processing for shaping so that the metal phase comprised mainly of Cu present in the part has an average size of 0.1 μm or less.

13. A processed part of a high strength electrical steel sheet as set forth in any one of claims 1 to 7 and 11 and 12, characterized wherein the part is heat treated after processing for shaping so that the part has an average crystal grains size of 3 to 300 μm.

14. A processed part of a high strength electrical

steel sheet as set forth in any one of claims 1 to 7 and 11 to 13, characterized wherein the part is heat treated after processing for shaping so that the number density of the metal phase comprised mainly of Cu with a size of 0.1 μm or less in the processed part is increased by 10-fold or more.

15. A processed part of a high strength electrical steel sheet as set forth in any one of claims 1 to 7 and 11 to 14, wherein the part is heat treated after processing for shaping so that the tensile strength is increased by 30 MPa or more.

16. A processed part of a high strength electrical steel sheet as set forth in any one of claims 1 to 7 and 11 to 15, wherein the part is heat treated after processing for shaping so that the hardness is increased by 1.1-fold or more.

17. A method of production of a high strength electrical steel sheet as set forth in any one of claims 11 to 16, characterized by making the residence time in the temperature range of 450°C to 700°C in the cooling process from a temperature range of 750°C or more after the final hot rolling process before cold rolling 300 seconds or less, then cold rolling without holding in a temperature range over 750°C so as to keep the steel soft before processing for shaping and harden it by heat treatment after the processing for shaping.

18. A method of production of a high strength electrical steel sheet as set forth in claim 17, characterized by holding at 750°C or more in a final heat treatment process after hot rolling and cold rolling, then making the residence time in the temperature range of 450°C to 700°C in the cooling process from the temperature range of 750°C or more 60 seconds or less, then not holding in a temperature range over 750°C so as to keep the steel soft before processing for shaping and harden it by heat treatment after processing for shaping.

19. A method of production of a processed part of a high strength electrical steel sheet characterized by processing for shaping a magnetic steel sheet as set forth in any of claims 1 to 7 and 11 to 16 or an electrical steel sheet produced by a method as set forth in any of claims 17 and 18, then holding in a temperature range of 300°C to 720°C for 5 seconds or more, then not holding in a temperature range over 700°C for 20 seconds or more to obtain the processed part.

20. A method of production of a processed part of a high strength electrical steel sheet as set forth in claim 19, characterized by, as said heat treatment method, making an average cooling rate of a cooling process from the heat treatment temperature to 700°C in heat treatment after processing the steel sheet to an electrical part 10°C/seconds or more, holding in a temperature range of 300°C to 720°C for 5 seconds or more, then not holding in a temperature range over 700°C for 20 seconds or more.